Ordering number: EN 1820C

Monolithic Linear IC



No. 1820C

LA1265

FM/AM Tuner of Electronic Tuning Type

Functions

FM: IF amp, quadrature detector, AF preamp, signal meter, tuning indicator drive output (common with stop signal, muting drive output)

AM: RF amp, MIX, OSC (with ALC), IF amp, detector, AGC, signal meter, tuning indicator drive output (common with stop signal).

Features

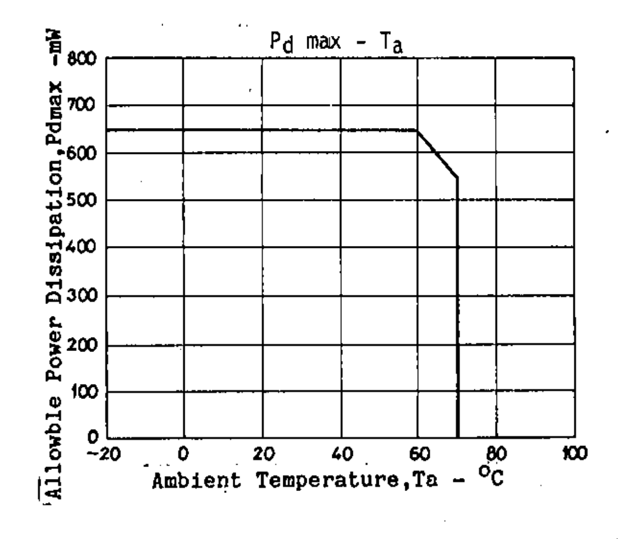
. Minimum number of external parts required.
. Excellent S/N
. Local OSC with ALC
. Local OSC buffer
. Tuning indicator pin (common with narrow-band stop signal and muting drive output)
. Variable stop sensitivity (variable separately for FM, AM)
. Low whistle
. Signal meter pin.

Maximum Ratings at Ta=25°C, See Test Circuit.

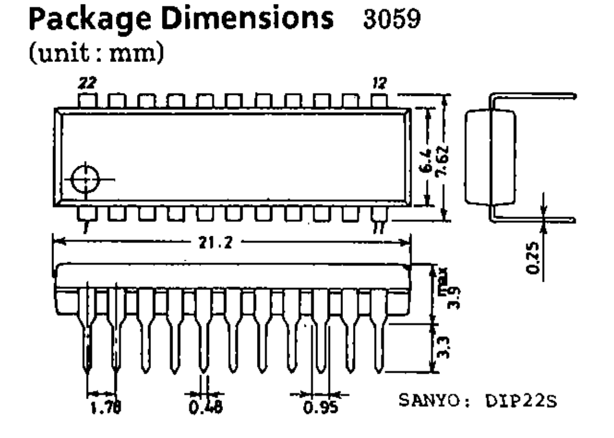
				unit
Maximum Supply Voltage	$V_{CC}max$	Pins 7,8,17	16	V
Flow-in Current	I_8	Pin 8	20	mA
Flow-out Current	I_{20}	Pin 20	1	mA
	I_{22}	Pin 22	2	mA
Allowable Power Dissipation	Pdmax	Ta=≦60°C	650	mW
Operating Temperature	Topr		-20 to +70	°C
Storage Temperature	Tstg		-40 to +125	°C

Operating Conditions at Ta=25°C

			unit
Recommended Supply Voltage	V_{CC}	8.5	V
Operating Voltage Range	V_{CC} op	6 to 14	V



Package Dimensions 3059
(unit: mm)



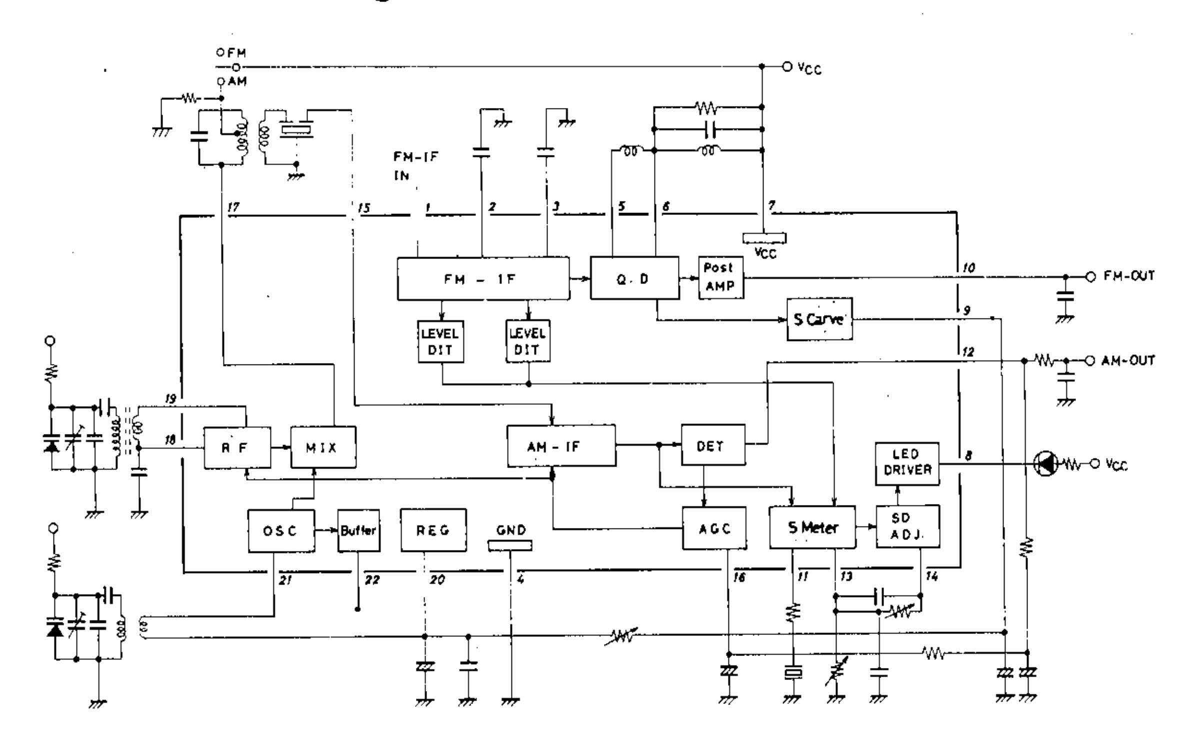
Operating Characteristics at Ta=25°C,V_{CC}=8.5V,See Test Circuit.

[AM: f=1MHz]			min	typ	max	unit
Quiescent Current	Icco	No input		18	26	mA
Detection Output	Vo(1)	Vi=20dBu,400Hz,30% mod.	30	50	90	mV
	Vo(2)	Vi=80dBu,400Hz,30% mod.	110	160	220	mV
S/N	S/N(1)	Vi=20dBu	16	20		dB
	S/N(2)	Vi=80dBu	49	54		dB
Total Harmonic Distortion	THD(1)	Vi=80dBu,400Hz,30% mod.		0.3	1.0	%
	THD(2)	Vi=107dBu,400Hz,30% mod.		0.5	2.0	%
Signal Meter Output	$V_{SM(1)}$	No input	0	0	0.2	V
	$V_{SM(2)}$	Vi=80dBu	2.4	2.8	3.1	V
LED Lighting Sensitivity	LED on	I_{LED}=1mA	15	24	33	dBu
Local OSC Buffer Output	Vosc	f_{osc}=1.45MHz	220	275	330	mV

[FM: f=10.7MHz]			min	typ	max	unit
Quiescent Current	Icco	No input		20	28	mA
Input Limiting Sensitivity	-3dBL.S	3dBdown,400Hz,100% mod.		31	37	dBu
Demodulation Output	Vo	Vi=100dBu,400Hz,100% mod.	240	330	460	mV
S/N	S/N	Vi=100dBu	78	84		dB
Total Harmonic Distortion	THD	Vi=100%dBu,400Hz,100% mod.		0.03	0.3	%
Signal Meter Output	$V_{SM(1)}$	No input	0	0	0.2	V
	$V_{SM(2)}$	Vi=100dBu	1.5	2.7	3.1	V
LED Lighting Sensitivity	LED-on	I_{LED}=1mA	35	50	65	dBu
LED Lighting Bandwidth	LED-BW	Vi=100dB,I_{LED}=1mA	90	120	160	kHz
AM Rejection	AMR	Vi=100dBu,FM=400Hz 100% mod. AM=1kHz 30% mod.	45	60		dB

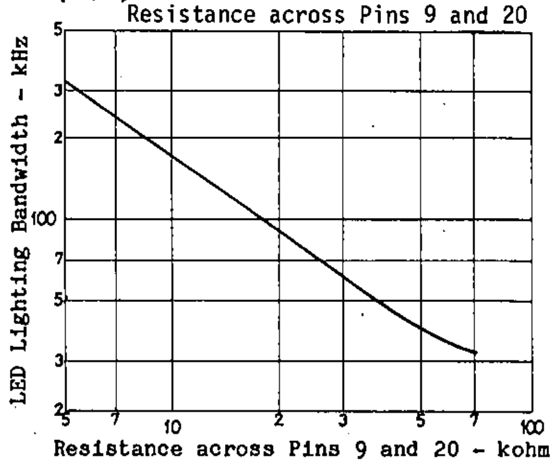
Note: Be fully careful of dielectric breakdown.

Equivalent Circuit Block Diagram



How to use the LA1265

1. LED lighting, muting drive output, stop signal (S.D)



① For LED lighting, muting drive output, stop signal, the output at pin 8 is used.

② The voltage on pin 8, when tuned, turns from "H" to "L". (Active-Low)

③ Signal bandwidth at pin 8

. For AM, the bandwidth depends on the CF (BFU450CN) at pin 11. If a capacitor is connected in place of the CF, the bandwidth will get wider.

. For FM, the bandwidth depends on the resistance across pins 9 and 20. If the resistance is increased, the bandwidth will get narrower. R=15kohms makes the bandwidth approximately 120kHz.

④ Sensitivity adjustment of LED, muting, stop signal

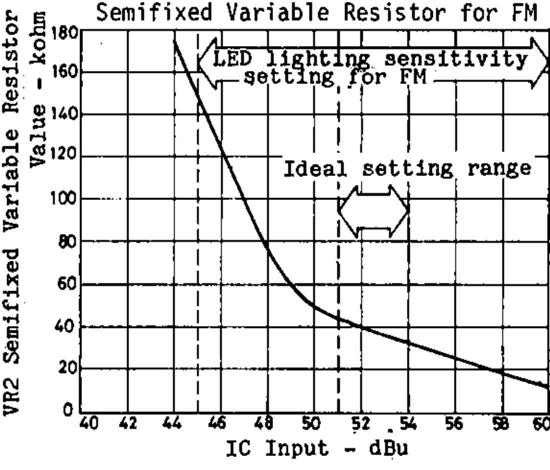
. For FM, the semifixed variable resistor across pin 13 and GND is used.

. For AM, the semifixed variable resistor across pins 13 and 14 is used.

Be sure to start adjustment for FM, and then make adjustment for AM. For the stop signal sensitivity and FM stop signal bandwidth, the variations should be considered and it is recommended to use the semifixed variable resistor for adjustment.

⑤ LED lighting sensitivity setting for AM

For the LED lighting sensitivity setting for AM, it is desirable that the IC input be 30dBu (antenna input: approximately 50dB/m). In this case, the value of VR1 is 30kohms.



⑥ LED lighting sensitivity setting for FM

For the LED lighting sensitivity setting for FM, the IC input may be 45dBu to 60dBu. With the variations in the front end considered, it is ideal that the IC input in a standard receiving set be 51dBu to 54dBu. The lower value of VR2 for the LED lighting sensitivity setting is as illustrated right. Since the variations in the front end cause the IC input setting sensitivity to vary, it is recommended to use a value of VR2 at an input voltage lower than a standard setting by 6dB or greater. For example, if IC inut 53dBu is taken as a standard, use VR2=100kohms at IC input 47dBu.

2. AM/FM changeover

① Two selections are available for changeover as shown below: (A) pin 17-used method and (B) pin 18-used method.

② For (A), the voltage on pin 17 relative to V_{CC} (pin 7) must be within the range of -0.8V to +0.1V. If not within this range, distortion and selectivity will get worse.

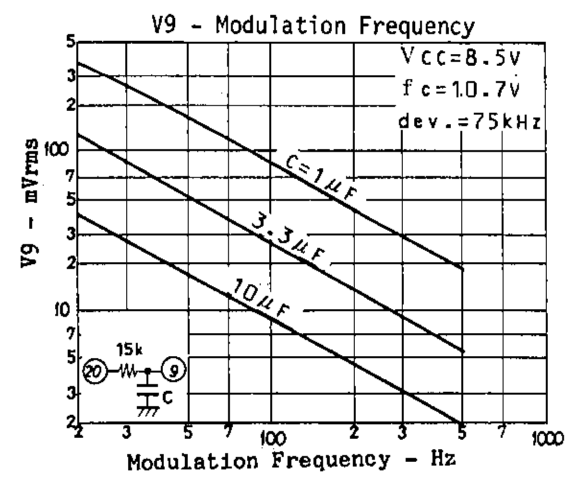
③ For (A), a resistance of 68kohms at the IFT cold terminal, which is used to prevent the changeover circuit from malfunctioning, must be connected.

(A) Pin 17-used method for AM/FM changeover

(B) Pin 18-used method for AM/FM changeover

Unit (resistance: Ω)

3. Local OSC buffer output
 ① When local OSC buffer output waveform is saw-toothed at the SW mode, connect a resistance of 1.2kohms or thereabouts across pin 22 and GND.
4. AM input pin
 ① It is desirable that the AM input pin (pin 19) be L-coupled to pin 18.
 ② Inputting to pin 19 can be done by DC-cutting with a capacitor. However, an unbalance in the RF amplifier (differential amplifier) causes gain drop and whistle worsening.
5. Capacitance across pin 9 and GND
 A large capacitance across pin 9 and GND may cause a misstop at an adjacent channel when the channel select speed is made faster at the automatic channel select mode. In this case, decrease the capacitance across pin 9 and GND. However, if too decreased, the LED will flutter at low modulation frequencies at the time of detuning. Therefore, it is recommended to fix the capacitance across pin 9 and GND to be 3.3uF to 10uF. The relation between modulation frequency and demodulation output voltage on pin 9 with the capacitance across pin 9 and GND as a parameter is shown right.



6. If the coupling coefficient of the local OSC coil is small and an anti-resonance point of approximately 100MHz is present or the stray capacitance across pins 22 and 21 is large, a parasitic oscillation of approximately 100MHz may occur in the buffer output (pin 22). In this case, connect a capacitance of approximately 30pF across pin 22 and GND.
7. AM OSC coil
 Generally speaking, the following should be noted. Avoid winding with loose coupling between primary side and secondary side (especially SW1, SW2). To put it concretely, the pot core type is better than the screw core type which is loose in coupling. This prevents the local OSC frequency from turning third resonance frequency related to the coupling coefficient.
8. Resistance across pin 8 and V_{DD}
 If pin 8 is used for the stop signal (SD) only, without using LED, it is recommended to fix resistance R_L across pin 8 and GND to be 51kohms to 100kohms.
9. To prevent whistle from worsening, make the pattern of AM output pin 12 as short as possible.

Input/Output Admittance

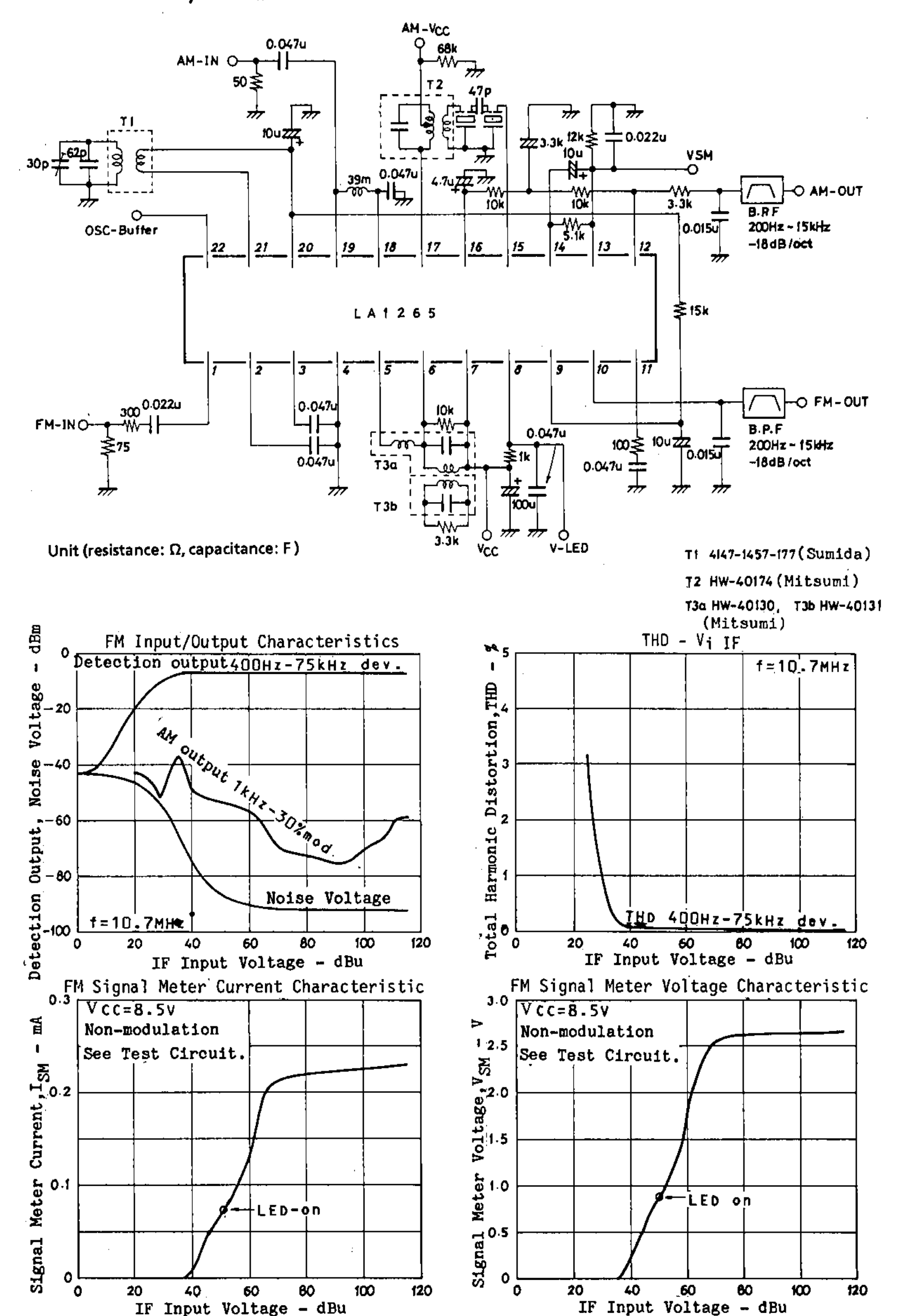
FM

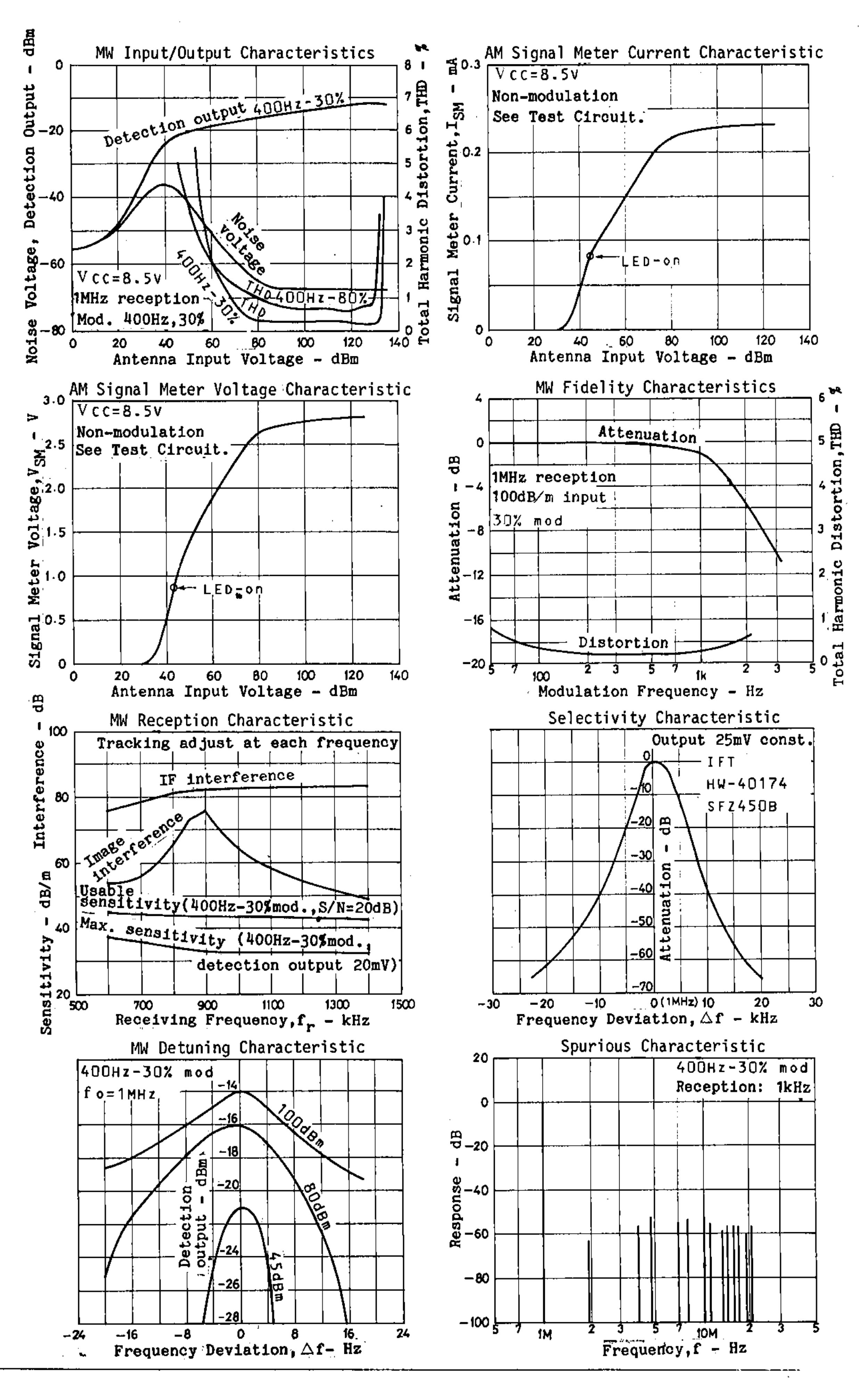
-	Parameter	Frequency	-	Admittance	unit
IF	yi1	10.7MHz	ri	330	Ω
			ci	20	pF

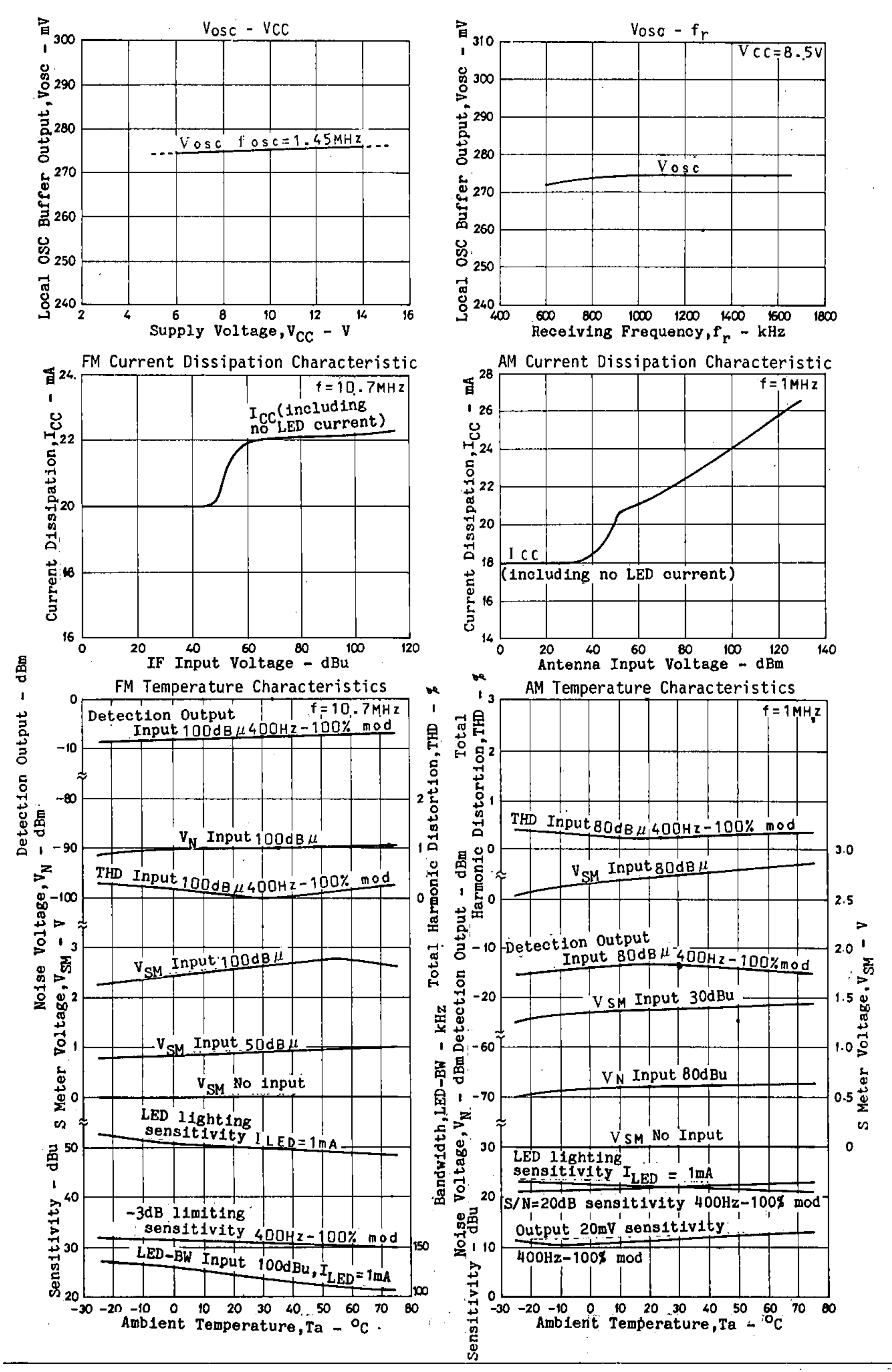
AM

-	Parameter	Frequency	-	Admittance		unit
				AGC-off(V16=1.4V)	AGC-on(V16=2.5V)	
RF	yi19	1MHz	ri	15	16	kΩ
			ci	4	4	pF
MIX	yo17	500kHz	ro	-	-	kΩ
			co	3	3	pF
IF	yi15	500kHz	ri	2	2	kΩ
			co	10	8	pF

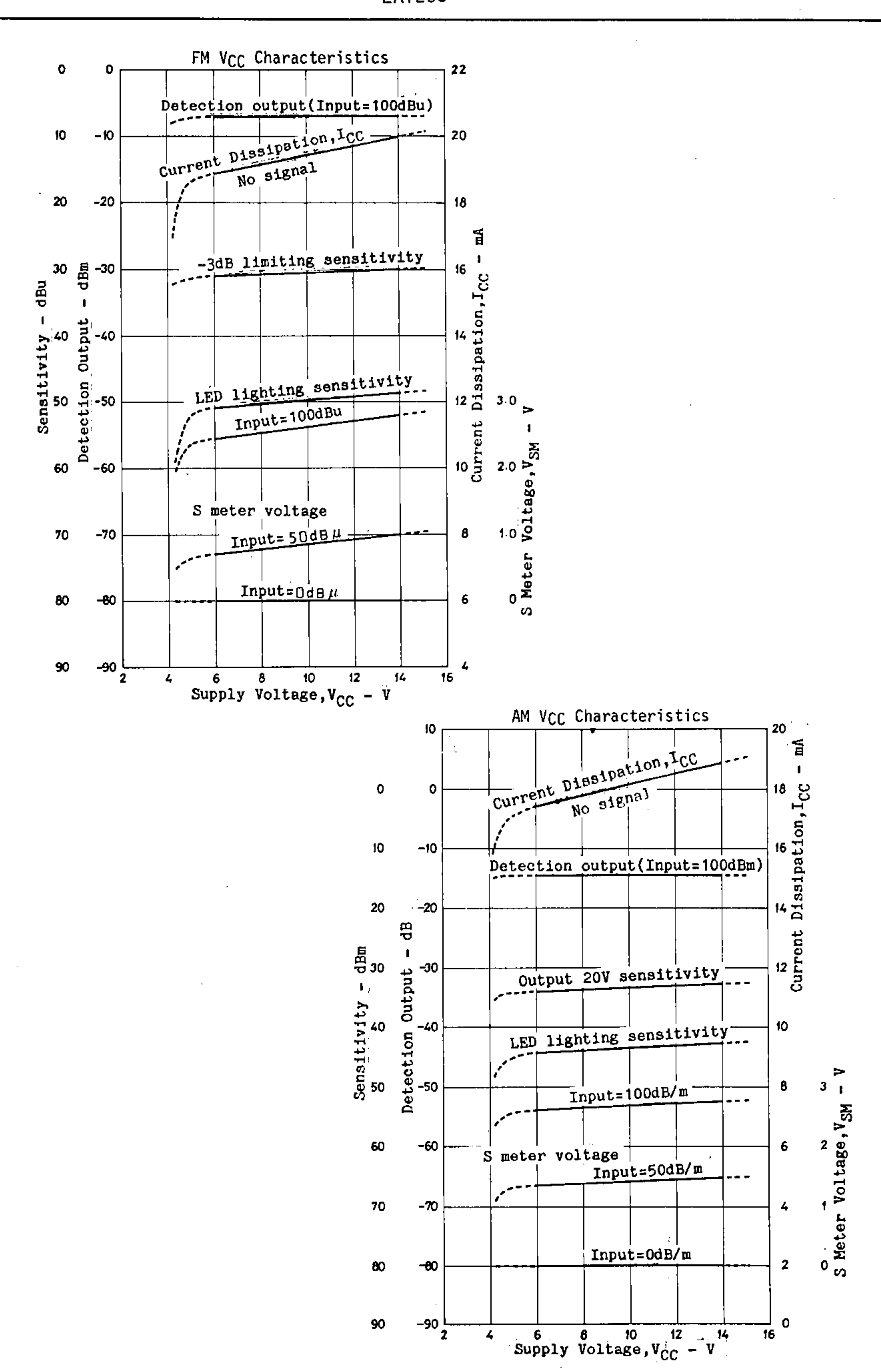
Test Circuit : FM, AM-MW



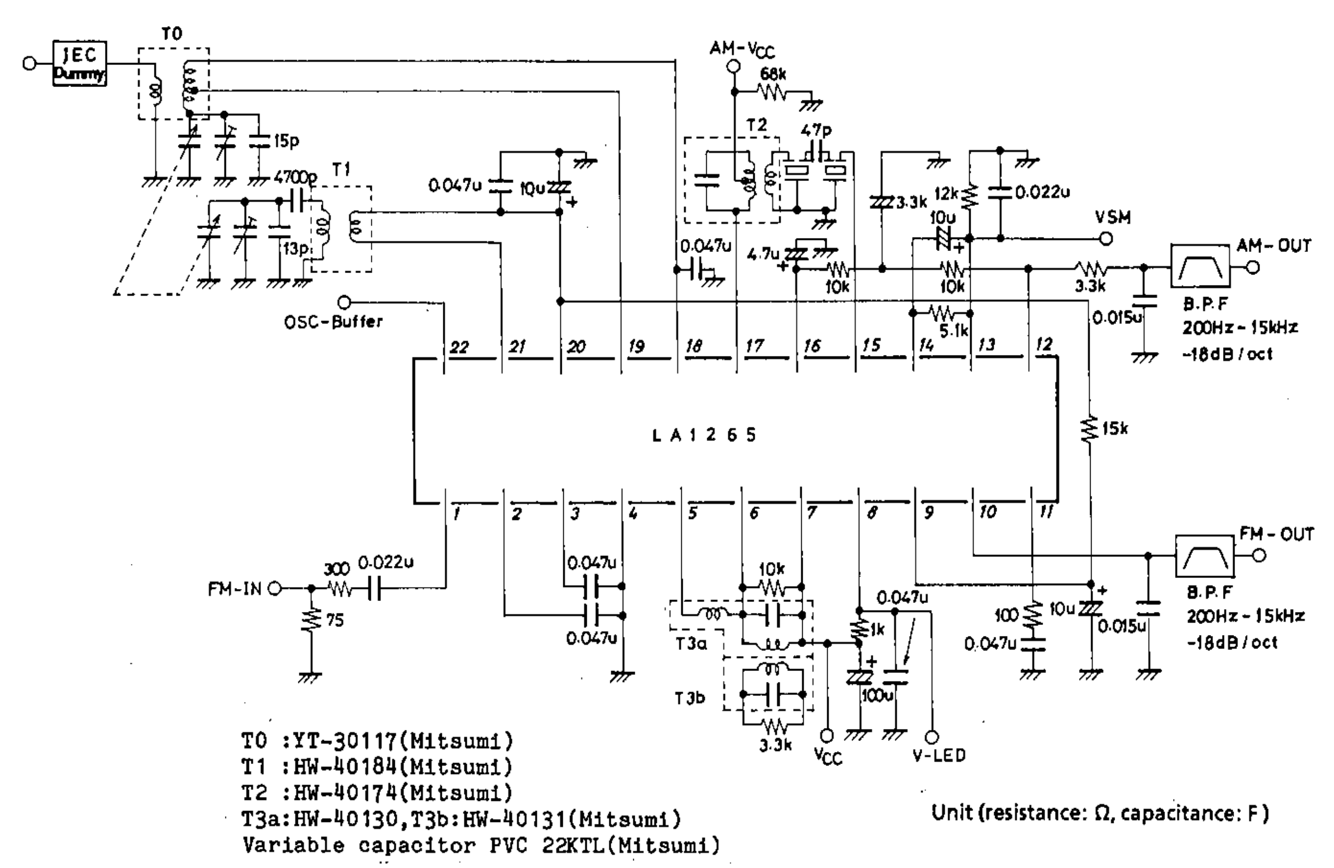

MW Input/Output Characteristics
Detection output 400Hz-30%
Noise voltage
400Hz-30% THD
THD 400Hz-80%
Vcc=8.5V
1MHz reception
Mod. 400Hz,30%
Noise Voltage, Detection Output - dBm
Total Harmonic Distortion,THD - %
Antenna Input Voltage - dBm
AM Signal Meter Current Characteristic
Vcc=8.5V
Non-modulation
See Test Circuit.
LED-on
Signal Meter Current, I_{SM} - mA
Antenna Input Voltage - dBm
AM Signal Meter Voltage Characteristic
Vcc=8.5V
Non-modulation
See Test Circuit.
LED-on
Signal Meter Voltage, V_{SM} - V
Antenna Input Voltage - dBm
MW Fidelity Characteristics
Attenuation
1MHz reception
100dB/m input
30% mod
Distortion
Attenuation - dB
Total Harmonic Distortion,THD - %
Modulation Frequency - Hz
MW Reception Characteristic
Tracking adjust at each frequency
IF interference
Image interference
Usable sensitivity(400Hz-30%mod.,S/N=20dB)
Max. sensitivity (400Hz-30%mod., detection output 20mV)
Sensitivity - dB/m Interference - dB
Receiving Frequency, f_r - kHz
Selectivity Characteristic
Output 25mV const.
IFT
HW-40174
SFZ450B
Attenuation - dB
Frequency Deviation, Δf - kHz
MW Detuning Characteristic
400Hz-30% mod
fo=1MHz
100dBm
80dBm
45dBm
Detection output - dBm
Frequency Deviation, Δf- Hz
Spurious Characteristic
400Hz-30% mod
Reception: 1kHz
Response - dB
Frequency, f - Hz



Vosc - VCC
Local OSC Buffer Output,Vosc - mV
Vosc fosc=1.45MHz
Supply Voltage,V_{CC} - V
Vosc - f_r
Vcc=8.5V
Vosc
Receiving Frequency,f_r - kHz
FM Current Dissipation Characteristic
f=10.7MHz
I_{CC}(including no LED current)
Current Dissipation,I_{CC} - mA
IF Input Voltage - dBu
AM Current Dissipation Characteristic
f=1MHz
Icc
(including no LED current)
Antenna Input Voltage - dBm
FM Temperature Characteristics
f=10.7MHz
Detection Output
Input 100dBμ400Hz-100% mod
V_N Input 100dBμ
THD Input 100dBμ400Hz-100% mod
V_{SM} Input 100dBμ
V_{SM} Input 50dBμ
V_{SM} No input
LED lighting sensitivity I_{LED}=1mA
-3dB limiting sensitivity 400Hz-100% mod
LED-BW Input 100dBu,I_{LED}=1mA
Detection Output - dBm
Noise Voltage,V_N - dBm
S Meter Voltage,V_{SM} - V
Sensitivity - dBu
Total Harmonic Distortion,THD - %
Bandwidth,LED-BW - kHz
Ambient Temperature,Ta - °C
AM Temperature Characteristics
f=1MHz
THD Input 80dBμ400Hz-100% mod
V_{SM} Input 80dBμ
Detection Output
Input 80dBμ 400Hz-100%mod
V_{SM} Input 30dBu
V_N Input 80dBu
V_{SM} No Input
LED lighting sensitivity I_{LED} = 1mA
S/N=20dB sensitivity 400Hz-100% mod
Output 20mV sensitivity
400Hz-100% mod
Total Harmonic Distortion,THD - %
Detection Output - dBm
Noise Voltage,V_N - dBm
Sensitivity - dBu
S Meter Voltage,V_{SM} - V
Ambient Temperature,Ta - °C


FM V_{CC} Characteristics
Detection output(Input=100dBu)
Current Dissipation, I_{CC}
No signal
-3dB limiting sensitivity
LED lighting sensitivity
Input=100dBu
S meter voltage
Input=50dBμ
Input=0dBμ
Sensitivity - dBu
Detection Output - dBm
Current Dissipation, I_{CC} - mA
S Meter Voltage, V_{SM} - V
Supply Voltage, V_{CC} - V
AM V_{CC} Characteristics
Current Dissipation, I_{CC}
No signal
Detection output(Input=100dBm)
Output 20V sensitivity
LED lighting sensitivity
Input=100dB/m
S meter voltage
Input=50dB/m
Input=0dB/m
Sensitivity - dBm
Detection Output - dB
Current Dissipation, I_{CC} - mA
S Meter Voltage, V_{SM} - V
Supply Voltage, V_{CC} - V

Test Circuit : SW2



SW2 Input/Output Characteristics

f=8.5MHz

Detection output 400Hz-30%

Noise voltage

Detection output 400Hz-30%

Noise Voltage, Detection Output - dBm

Total Harmonic Distortion, THD - %

IEC Input Voltage - dBu

SW2 Input/Output Characteristics

f=14MHz

Detection output 400Hz-30%

Noise voltage

THD 400Hz-30%

Noise Voltage, Detection Output - dBm

Total Harmonic Distortion, THD - %

IEC Input Voltage - dBu

SW2 Input/Output Characteristics

f=21MHz

Detection output 400Hz-30%

Noise voltage

THD 400Hz-30%

Noise Voltage, Detection Output - dBm

Total Harmonic Distortion, THD - %

IEC Input Voltage - dBu

8.5MHz Spurious Response

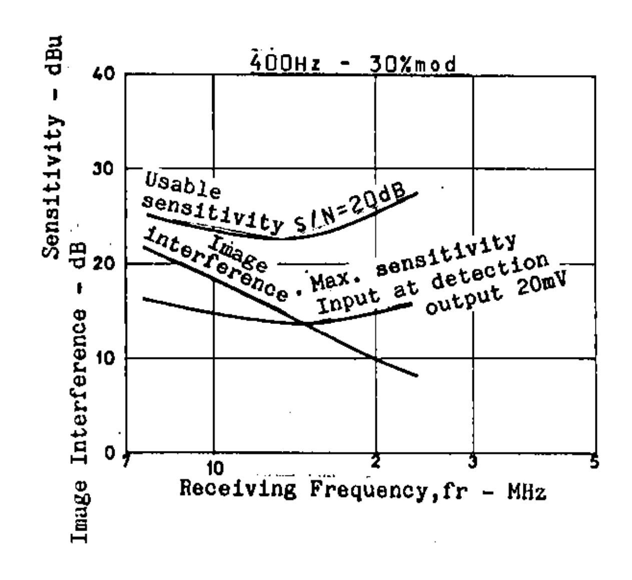
Referenced to output-20dBm

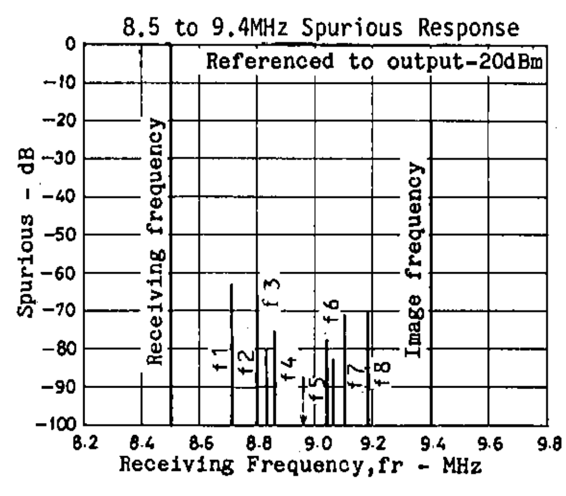
Receiving frequency

Image frequency

Spurious - dB

Frequency, f - MHz





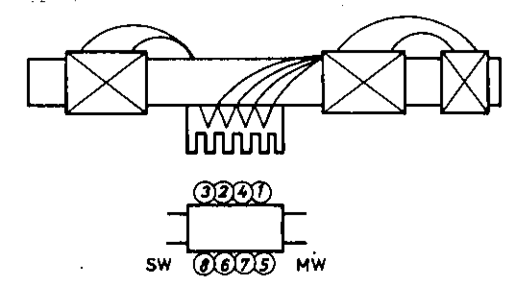
f1: 8.724MHz → 2fosc-2f1=455kHz
f2: 8.799MHz → 3fosc-3f2=455kHz
f3: 8.836MHz → 4fosc-4f3=455kHz
f4: 8.859MHz → 5fosc-5f4=455kHz
f5: 9.038MHz → 5f5-5fosc=455kHz
f6: 9.061MHz → 4f6-4fosc=455kHz
f7: 9.098MHz → 3f7-3fosc=455kHz
f8: 9.173MHz → 2f8-2fosc=455kHz

Coil Specifications

MW antenna

Bar antenna (for PVC22KTL)

·TN-10896(Mitsumi)



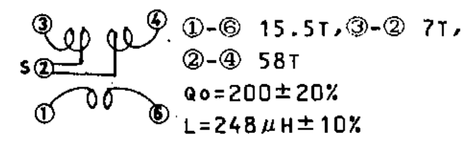
①-② 22T+49T, ③-④ 10T
Tight solenoid direct winding
⑤-⑥ 17T 0.5ϕ space winding
⑦-⑧ 4T tight solenoid winding
①-② L=260μH, Qo=330(≧200)
⑤-⑥ L=15μH, Qo=250(≧150)

Loop antenna (for SVC321)

·LA300(Korin Giken)

Loop antenna matching coil

·KL-412

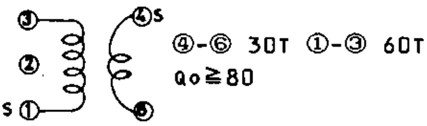


①-⑥ 15.5T, ③-② 7T,
②-④ 58T
Qo=200±20%
L=248μH±10%

MW OSC

·4147-1457-177(Sumida)

For PVC22KTL



④-⑥ 30T ①-③ 60T
Qo≧80

·KO-387(Korin Giken)

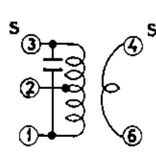
For SVC321

③ ② S① ④ ⑥S

①-③ 48T, ④-⑥ 20T
Qo=150±20%

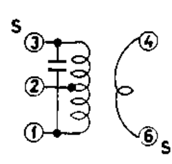
AM-IFT

Matching coil for SFU450B (1-element type)



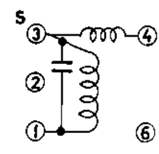
·HW-40173 (Mitsumi)	2150-2162-197 (Sumida)
①-② 82T, ③-② 70T,	①-② 103T, ③-② 71T,
④-⑥ 7T	④-⑥ 8T
Qo=110±20%, f=450kHz	Q≧80, f=450kHz
Internal 180pF	Internal 180pF

Matching coil for SFZ450B (2-element type)



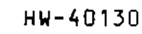
·HW-40174 (Mitsumi)	·2150-2061-049 (Sumida)
①-② 58T, ③-② 94T,	①-② 54T, ③-② 120T,
④-⑥ 10T	④-⑥ 12T
Qo=80±20%, f=450kHz	Qo≧40
Internal 180pF	Internal 180pF

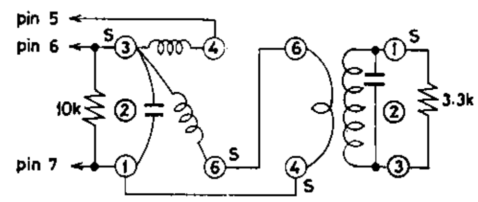
FM single tuning detection coil



·HW-40122 (Mitsumi)	·2231-016 (Sumida)
③-④ 84.5T, ③-① 19T	③-④ 73.5T, ③-① 19T
Qo=35±20%, f=10.7MHz	Qo=30±20%, f=10.7MHz
Internal 82pF±10%	Internal 82pF±10%
Damping resistance	Damping resistance

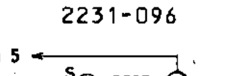
FM double tuning detection coil





·HW-40130 (Mitsumi)	·HW-40131 (Mitsumi)
③-④ 86.5T	④-⑥ 1T
③-⑥ 13.5T	①-③ 19T
Qo=50±20%	Qo=35±20%
Internal 100pF±10%	Internal 100pF±10%

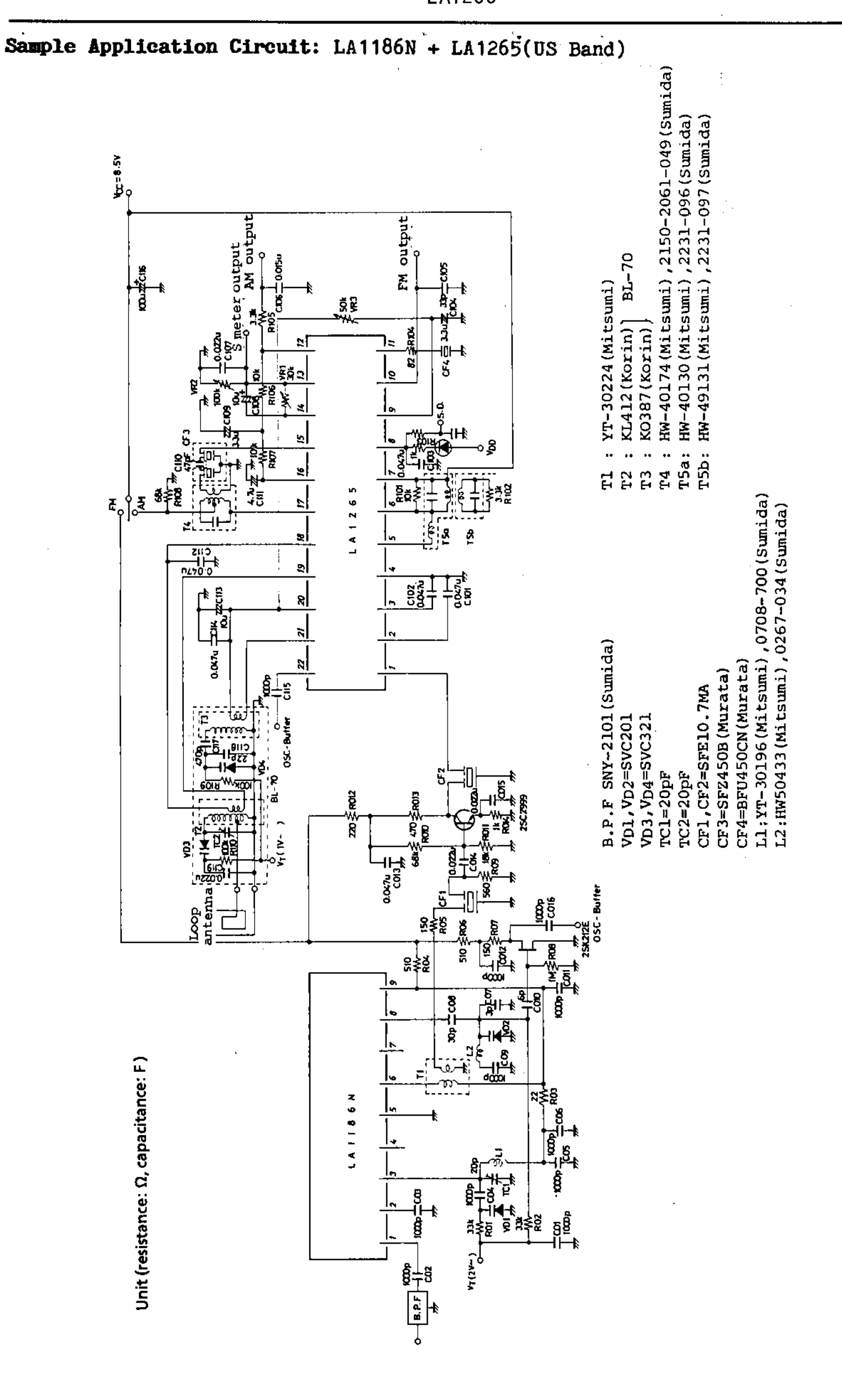
2231-096 2231-097



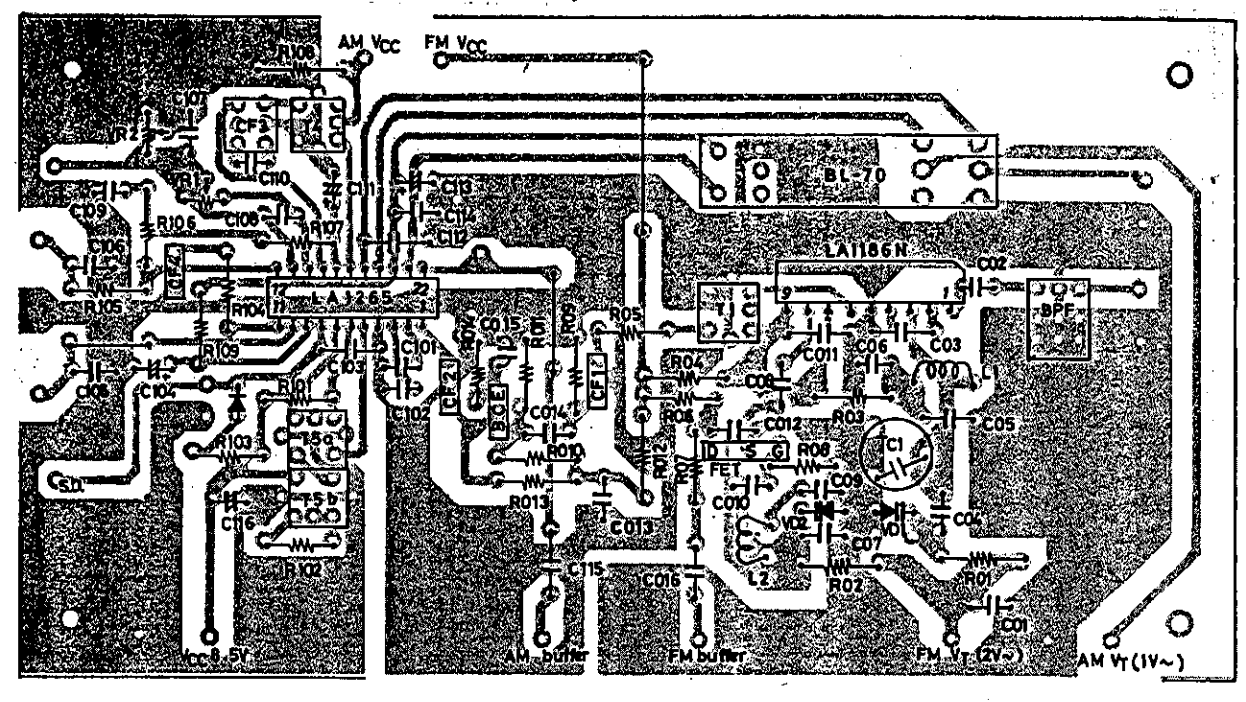
·2231-096 (Sumida)	·2231-097 (Sumida)
③-④ 73.5T	④-⑥ 2T
③-⑥ 23.5T	①-③ 21T
Qo=50±20%	Qo=47±20%
Internal 62pF±10%	Internal 82pF±10%

Unit (resistance: Ω)

Sample Application Circuit: LA1186N + LA1265(US Band)



Example of Printed Pattern (Cu-foiled area)



LA1186N + LA1265 Overall Characteristics

Detection output (75k dev)

Vcc=8.5V

fc=98MHz

fm=400Hz

Signal meter VR2=12kΩ

AM output (1kHz-30%)

Noise voltage

LED-on

THD (75k dev)

Signal Meter - V

Total Harmonic Distortion, THD - %

Noise Voltage, AM Output, Detection Output - dBm

Input - dBu

LA1186N + LA1265 Overall Characteristics

fc=1000kHz

fm=400Hz

Detection output (30%)

Signal meter VR1=5.1kΩ VR2=12kΩ

Noise voltage

LED-on

THD (80%)

THD (30%)

Signal Meter - V

Total Harmonic Distortion, THD - %

Noise Voltage, Detection Output - dBm

Input - dB/m